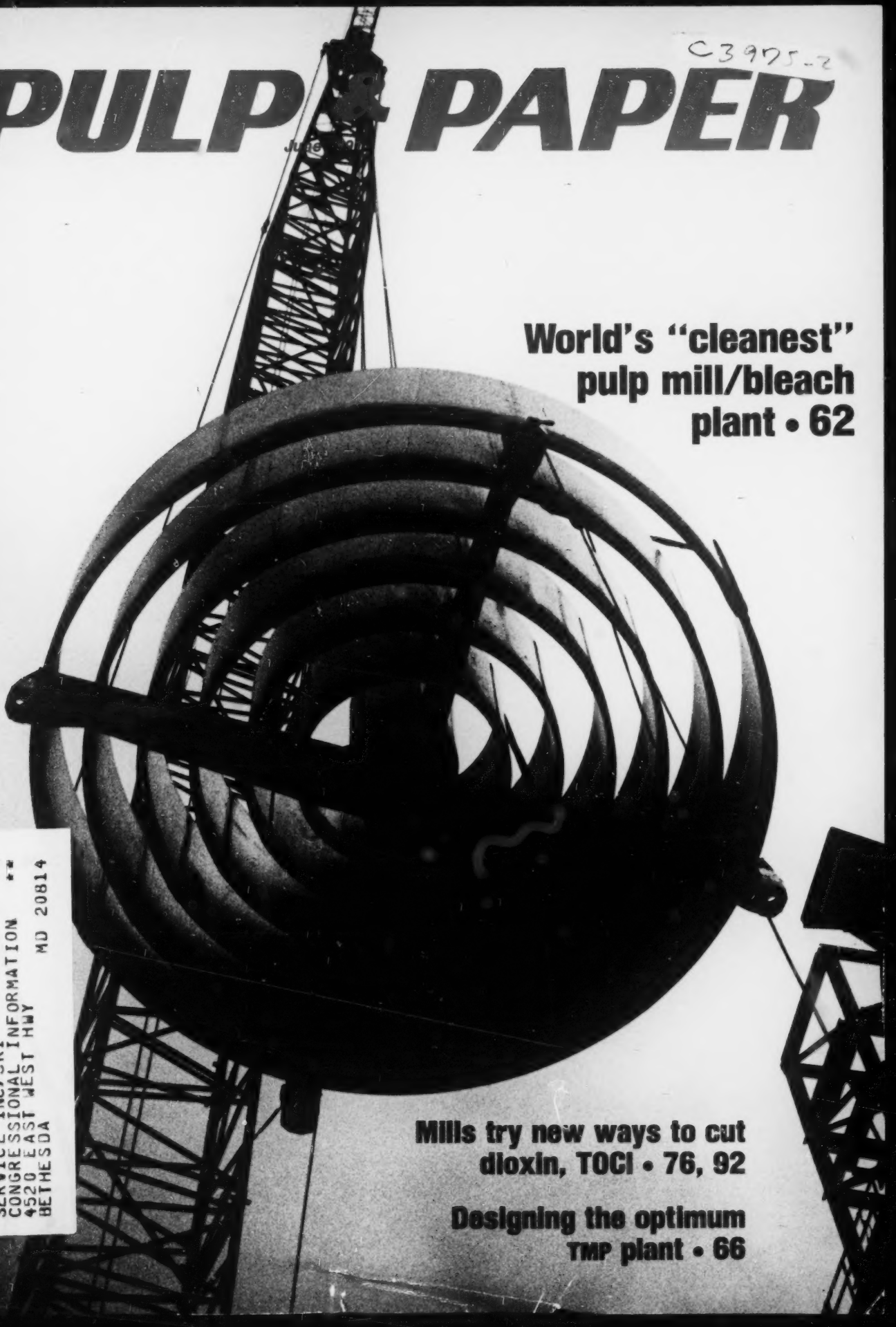
C3975-2

PULP & PAPER

June 1991



World's "cleanest" pulp mill/bleach plant • 62

Mills try new ways to cut dioxin, TOCl • 76, 92

Designing the optimum TMP plant • 66

**********3-DIGIT 208
07002399798 090191 414
SERVICE INC/SRI **
CONGRESSIONAL INFORMATION **
4520 EAST WEST HWY
BETHESDA MD 20814

Volume 65
Number 6

JUNE

FOCUS: MECHANICAL PULPING

Expansion decline 49
Mechanical pulping projects are being cut back due to new demand for recycled fiber as well as the winding down of the market pulp boom

TMP newsprint mill design 66
Design strategies for an optimum thermomechanical pulp newsprint plant offer reduced production costs and a higher-quality end product

Groundwood in SC and LWC 105
Better printability as well as reduced chemical and energy costs drive use of groundwood furnish for printing/writing grades

FOCUS: CHEMICAL PULP BLEACHING

Bleach plant scrubbing 51
Mills can save money and reduce environmental hazards with proper design of a bleach plant scrubbing system; alternatives are discussed

New APP fiber line 62
In a few months, Alabama Pine Pulp Co. will startup one of the world's most technologically advanced pulping and bleaching operations at sprawling market pulp complex

Changes in bleach plant 76
The recent focus on dioxin by regulatory agencies and the public has forced mills to modify and better control bleach plant operations

Environmental alternatives 92
New bleaching and pulping methods abound as pulp and paper mills move to reduce dioxin and other chlorinated organic emissions

FEATURES

PAPERMAKING

Wet end chemistry 117
Linerboard producers can improve sheet quality and overall performance by analyzing system and optimizing pH ranges, refining, and chemistry

QUALITY CONTROL

Quality Control Toolbox 120
Final part of the series focuses on how mills can develop solid partnerships with suppliers through the use of quality audits

PROCESS AUTOMATION

Measurement system 90
Norfolk Paper's recycled, unbleached kraft mill in Norfolk, N.Y., installs new measurement system to boost production and improve control of basis weight and moisture

THE COVER

A single-stage, titanium, atmospheric diffusion washer is being lifted for installation in one of Alabama Pine Pulp Co.'s four bleach plant towers at Perdue Hill, Ala. As detailed in a feature report beginning on p. 62, APP will start up one of the world's most advanced pulp mill/bleach plant operations later this year. (Photo courtesy of Kamyr Inc.)

PULP&PAPER

EDITORIAL STAFF

ATLANTA
Editor in Chief Ken L. Patrick
Technical Editor Jim Young
Projects Editor Kelly H. Ferguson

CHICAGO
Technical Editor Andy Harrison

BRUSSELS
International Editors Peter Sutton
John Pearson
Hugh O'Brian

NEWS STAFF

SAN FRANCISCO
Executive News Editor Willard E. Mies
News Editor Carl P. Espe
News Editor Robert B. Galin
News Editor Sophie L. Wilkinson
News Editor James McLaren

NEW YORK
News Editor Noel DeKing

ETNA, MAINE
Senior News Editor Debra A. Garcia

PRODUCTION STAFF

SAN FRANCISCO
Managing Editor Margaret L. Brown
Assistant Managing Editor Kurt F. Duecker
Art Director Nancy E. Bentley
Departments Editor William S. McClanahan
Technical Artist Jill Dupont

Atlanta: 2000 Powers Ferry Center, Suite 450 Marietta, Ga. 30067; (404) 952-1303; Fax (404) 933-0666
Chicago: 35 E. Wacker Drive, Chicago, Ill. 60601; (312) 372-6238; Fax (312) 372-3864
San Francisco: 600 Harrison Street, San Francisco, Calif. 94107; (415) 905-2200; Telex 278273; Fax (415) 905-2240
New York: 370 Lexington Avenue, New York, N.Y. 10017; (212) 683-9294; Telex 220442; Fax (212) 725-0915
Etna, Maine: (207) 269-2494
Brussels: Chaussée de Charleroi 123a, Boite 5, B-1060, Brussels, Belgium

PUBLISHING HEADQUARTERS

SAN FRANCISCO
Publishing Director Leigh M. Freeman
Group Publisher Leonard E. Haas
Director of Production Andrew A. Mickus
Director of Circulation Jerry M. Okabe
Ad Production Coordinator Anmarie Achacoso
Marketing Manager Paula J. Irons
Marketing Coordinator Robin M. Connery
Editorial Secretary Rose Tobin

Sales and business offices are listed on Advertisers' Index page

Miller Freeman

Chairman of the Board ..... Clifford D. Jakes
President ..... Marshall W. Freeman
Senior Vice President ..... Charles C. Baake
Senior Vice President ..... Leonard E. Haas
Senior Vice President ..... Thomas L. Kemp
Senior Vice President ..... Wini D. Ragus
Vice President ..... Charles H. Benz
Vice President ..... Leigh M. Freeman
Vice President ..... Andrew A. Mickus
Vice President ..... Donald A. Pazour
Chief Financial Officer ..... Stephen A. Daniels
Treasurer ..... Miller Freeman III
Assistant Treasurer ..... Douglas M. Denny

JUNE

COLUMNS

From the Editors 7
by Jim Young
It's time to reconsider hemp

Career Development 39
by Roberta Bhasin
Bearding the lion

Quality Report 131
by Lars Ingman
Testing, measurement, and inspection

Comment 172
by Carl C. Landegger
Why invest in Eastern Europe?

DEPARTMENTS

Conference Calendar 41
News of People 135
Product Showcase 142
New Products 144
Product Review 149
Bookshelf 151
Letters 151
Supplier News 153

SERVICES

Reader Service Review 138
Reader Service Card 139
Professional Service Directory 160
Classified Advertising 162
Advertisers Index 170

NEWS

Month in Statistics 9
U.S. paper and paperboard production data for March

Market Report 11
SBS mills again try to raise prices
Kraft paper market results mixed
Have BCTMP makers touched bottom?

Grade Profile 13
Recycled paperboard: Producers add capacity

NEWS SCAN

U.S. paper industry earnings down 23
Canadian industry posts losses 27
G-P ramps up Ashdown machine 29
K-C to rebuild of Whiting machine 29
A-P pulp mill construction nears 29
Domtar restructures business 31
Weyco restructuring lumbers on 31
Abitibi to shut down Thunder Bay 33
Howe Sound has smooth startup 33
IP's environmental troubles grow 33
EPA looks again at dioxin hazards 35
Federal Paper Board to sell plants 35
Fox River buys Howard Paper 35
Rock-Tenn to buy Ellis 35
Boise plants cottonwoods 35

International News 37
EC investigates cartonboard suppliers
Wiggins Teape Appleton profits down
SCA sells Reedpack units
Daishowa under financial pressure

PULP & PAPER (ISSN 0033-4081) (Canadian GST permit number 124513185), with which is combined *Paper Mill News*, *Paper Trade Journal* and *Pacific Pulp & Paper*, is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 600 Harrison St., San Francisco, Calif. 94107. Second class postage paid at San Francisco and at additional mailing office. POSTMASTER: Please send addresses changes to PULP & PAPER, 600 Harrison St., San Francisco, Calif. 94107.

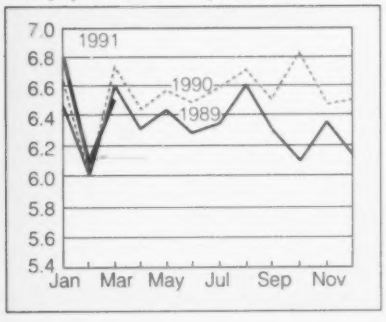
© Copyright 1991 by Miller Freeman Publications Inc. All rights reserved.

Subscriptions & Address Change: Sent without charge in the U.S.A. & Canada (upon written request) to individuals in pulp, paper, and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $85.00 a year in the U.S. All subscriptions to other countries: US$105.00 a year, except Europe and Mediterranean, US$120.00 (air service included). Single copy, US$8.50, except Buyers Guide, US$47.50. 16mm microfilm, 35mm microfilm, 105mm microfiche, and article and issue photocopies are available from University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48016; (313) 761-4700. Requests, subscription orders, and address changes must show name and position or job of individual, the name and location of mill, plant or office where employed, and the exact business or product produced at this location. **Send subscription correspondence to:** Circulation Department, PULP & PAPER, 600 Harrison St., San Francisco, Calif. 94107, or call Subscriber Service at 415-267-7645. For address change, include label from recent issue.

ABP

BPA

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.5 million tons in March, down 2.1% from the same month last year, according to the American Paper Institute. Production trended downward throughout the first quarter, finishing with a seasonally adjusted annualized rate of 77.5 million tpy, down 0.4% from the same time last year. Weakness continued to center on the paper grades, which were down 3.4% for the month and 2.7% for the quarter. Paperboard production has fared better, posting a 1.9% gain for the first quarter, although here too the trend is downward.

Among major grades, shipments of printing and writing paper were down 5.8% through March due to the strong impact of the recession on all major consumers, particularly magazine publishers, business forms converters, and envelope converters. Containerboard production for the domestic market was up 1.7% for the first quarter, but inventory building in January masked an overall decline in demand, API reports. Shipments of fiber boxes fell 8.9% in March from a year earlier, bringing the first-quarter total down 3.8%.

Canadian newsprint, woodpulp, and other paper statistics for March were not available at press time. U.S. imports of Canadian newsprint were down 7.3% in March, according to Commerce Dept. figures, bringing the rate for the first quarter down 3.7%. Woodpulp exports to the U.S. declined 3.5%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Mar.	574	5.7	6,686	4.1
Uncoated groundwood (s)	Mar.	147	-2.0	1,696	-4.7
Coated paper (s)	Mar.	588	-4.2	7,155	-3.7
Uncoated free-sheet (s)	Mar.	896	-8.9	10,898	-6.8
Other printing/writing	Mar.	137	-6.8	1,548	-6.0
Total packaging and other paper (s)	Mar.	390	-0.5	4,553	-0.6
Tissue	Mar.	485	-3.0	5,718	0.3
Total paper	**Mar.**	**3,217**	**-3.4**	**38,254**	**-2.7**
Unbleached kraft paperboard	Mar.	1,701	-0.8	20,593	3.8
Semichemical medium	Mar.	469	-3.3	5,681	1.1
Bleached paperboard	Mar.	387	-0.3	4,550	0.5
Recycled paperboard	Mar.	767	0.5	8,894	-1.1
Total paperboard	**Mar.**	**3,324**	**-0.8**	**39,718**	**1.9**
Total U.S. paper and paperboard output	**Mar.**	**6,540**	**-2.1**	**77,971**	**-0.4**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Feb.	5,033	0.9	63,672	2.1
Market pulp production	Feb.	756	12.0	9,115	4.0
Wastepaper consumption at paper/board mills	Feb.	1,669	3.2	20,912	4.7
Pulpwood consumption (cords)	Feb.	8,115	0.1	101,496	1.5
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Mar.	24.495	-8.9	76.072[6]	-3.8
Containerboard inventories at U.S. box plants and mills	Mar. 1	3,071	20.0		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Feb.	1,008	-2.4	12,681	-1.5
Imports of Canadian newsprint	Feb.	638	-7.3	7,989[6]	-3.7
U.S. paper exports (including products)	Feb.	643	28.9	7,739	19.4
Exports of unbleached kraft linerboard	Feb.	243	30.6	2,960	21.6
Exports of woodpulp	Feb.	485	18.3	5,765	15.7
Norscan pulp inventories[4]	Mar. 31	1,604	15.2		
Norscan pulp operating rates[4]	Mar.	88%	98%	88%	91%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Mar.	n.a.	—	n.a.[6]	—
Operating rates	Mar.	n.a.	n.a.	n.a.	n.a.
Inventories held by U.S. consumers	Mar. 31	n.a.	—		
Other paper/board shipments	Mar.	—	—	—	—
Woodpulp shipments (export only)	Mar.	n.a.	—	n.a.	—
Operating rates	Mar.	n.a.	n.a.	n.a.	n.a.

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Recycled paperboard: Producers add capacity to meet rising demand for recycled packaging

Grade structure: Recycled boxboard is made primarily from secondary fiber or wastepaper and is produced on either a fourdrinier, multi-ply, or cylinder paper machine. Grades include folding boxboard, corrugating medium, linerboard, gypsum wallboard, and core/can/tube stock.

Markets: Markets for recycled paperboard grades, as measured by their 1991 capacity share, are folding boxboard, 25.7%; setup boxboard, 3.0%; corrugating medium, 22.3%; gypsum wallboard, 13.2%; linerboard, 7.3%; container chipboard and filler board, 0.3%; and core/can/tube stock and other converting grades, 28.2%.

Production/capacity: Production declined 0.3% to 8.731 million short tons in 1990. Production in early 1991 remained at the same level as a year ago with good demand for containerboard and folding carton grades but lower demand for most other construction and industrial packaging grades.

The projected increase in capacity for recycled paperboard from 1991 to 1993 is 1.389 million tons, according to the American Paper Institute. This represents 4.4% annual growth over the next three years. Containerboard grades will account for 78%, or 1.086 million tons, of the additional capacity. Recycled linerboard capacity alone is expected to increase at a 39% annual rate to reach 1.453 million tons in 1993. From a significantly larger base of 2.229 million tons in 1990, recycled corrugating medium capacity will increase to 2.402 million tons in 1993.

These major recycled containerboard expansions will outpace current demand growth this year and perhaps again next year. Therefore, total industry operating rates are expected to drop to about 85% of capacity. However, mills that are producing folding boxboard and other consumer packaging grades should enjoy much higher operating rates.

Outlook: For 1991, production of recycled paperboard is forecast to increase by 1.5%. Mills will be helped by strong, steady demand for recycled folding boxboard and the displacement of kraft linerboard and semichemical corrugating medium by the recycled grades. Manufacturers of corrugated boxes plan on using more recycled linerboard and medium grades to increase the amount of recycled fiber in their packaging.

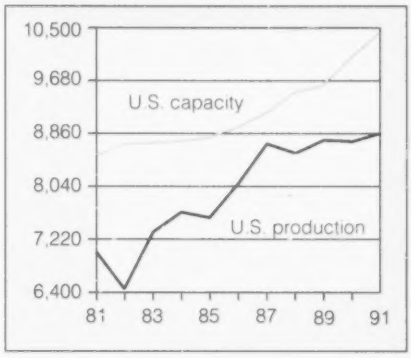
In early 1991, Green Bay Packaging Inc. converted its former semichemical medium mill in Green Bay, Wis., to recycled linerboard, using 100% wastepaper, and Stone Container Corp. is currently converting its Seminole kraft linerboard mill in Jacksonville, Fla., to recycled linerboard. By year-end 1992, total capacity for recycled linerboard will be close to 800,000 tons compared with approximately 463,000 tons at the end of 1989.

Demand for other grades of recycled paperboard is forecast to remain depressed until the long decline in home construction is reversed and sales of gypsum wallboard and other construction grades pick up again. The same is true for industrial core/can/tube packaging grades.

Prices: Mills successfully raised market prices for recycled folding boxboard grades twice in 1990. The current benchmark price for 20-pt, clay-coated newsback (CCNB), which is widely used in folding cartons, is $540 to $550/ton, and kraft back grades sell for about $560 to $580/ton. Prices of uncoated grades increased $25/ton to $365 to $385/ton. West Coast mill prices are typically $20 to $30/ton higher than eastern U.S. prices, and prices for special back grades are also typically higher than standard CCNB grades.

Historical prices: Clay-coated, 20-pt folding carton boxboard (rolls, $/short ton, year-end) prices are as follows: 1980, $380; 1981, $400/425; 1982, $380/425; 1983, $370/425; 1984, $375/425; 1985, $350/400; 1986, $380/420; 1987, $390/415; 1988, $465/$510; 1989, $465/$510; 1990, $540/$580. Bending 20-pt chipboard (rolls, $/short ton, year-end) prices are as follows: 1980, $260/275; 1981, $270/280; 1982, $280; 1983, $280/300; 1984, $300; 1985, $300; 1986, $320; 1987, $320; 1988, $340/$360; 1989, $340/$360; 1990, $365/$385. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1989	1990	1991
Production[1]	8,754	8,731	8,862e
Capacity[1]	9,617	10,026	10,455
Utilization rate	91.0%	87.1%	84.8%
Imports	95	100	85
Exports	38	52	64
Apparent U.S. consumption	8,811	8,779	8,883
lb/capita	71.85	70.34	71.00
GNP ratio[2]	2.14	2.11	2.11

1. American Paper Institute production, capacity data.
2. 1,000 tons/$ billion real GNP.
e = *Pulp & Paper* estimates.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity (000 tons)	Market share (%)
1. Jefferson Smurfit	1,330	12.7
2. Newark Group	875	8.4
3. Sonoco Products	850	8.1
4. Rock-Tenn[1]	607	5.8
5. Carauster Industries	565	5.4
6. Inland Container	550	5.3
7. Waldorf	395	3.8
8. U.S. Gypsum	390	3.7
9. Packaging Corp.[2]	280	2.7
10. National Gypsum	240	2.3
11. Federal Paper Board	200	1.9
12. James River	180	1.7

Market share of top five companies:
40.4%
Market share of top ten companies:
57.5%
Total U.S. capacity (1991):
10.455 million short tons

1. Acquired former Specialty Paperboard Inc. mill in Sheldon Springs, Vt., in early 1991.
2. Acquired Jackson Paper Mfg. Co. in late 1990.

SALES AND EARNINGS

U.S. paper industry earnings down 54%

Through the first quarter of 1991, declining prices, sluggish demand, and excess capacity continued to squash markets for U.S. paper companies. Georgia-Pacific Corp. and Boise Cascade Corp. reported losses, and the results for a number of other major companies hovered at break-even levels. A *Pulp & Paper Week* survey of 31 U.S. paper and forest products companies showed a net earnings decline of 53.9% to $584.4 million in the first quarter of 1991 compared with the same period in 1990. Sales revenue among the companies surveyed slipped 4.1% to $22.6 billion.

Price erosion in pulp, linerboard, and printing/writing paper and the apparent failure of the Jan. 1 newsprint price hike late in the quarter hurt the performance of many companies, some of which also struggled with abysmal wood products markets despite the recent improvement seen in housing starts and lumber prices. Some companies were also hurt by higher interest and depreciation from recent expansion projects. Companies that managed profit growth in the period included Kimberly-Clark Corp., Pentair Inc., P.H. Glatfelter Co., and Wausau Paper Mills Co. Some analysts projected that paper industry earnings would trough in the second quarter, while wood products businesses may have hit the bottom in the first quarter and should begin to turn around.

Some losers. Despite pretax gains on the sale of some U.S. containerboard assets and a French packaging unit in the first quarter, Georgia-Pacific reported a surprising $7-million loss, compared with a profit of $101 million in 1990. Excluding the asset sales, the company had a net loss of $50 million. Its operating profit from pulp and paper declined to $146 million from $182 million, the company said, while building products plunged to $7 million from $115 million.

"The company's performance obviously has been affected by the economic downturn," said G-P CEO T. Marshall Hahn Jr. All of the net proceeds from assets sales were applied to debt, G-P said, which was reduced by about $855 million in the first quarter.

An $8-million loss was reported by Louisiana-Pacific Corp., which had earnings of $35.8 million in the first quarter of 1990, with "conditions in the building products market among the worst we've ever seen," the company commented. Falling pulp prices also hurt earnings.

As it had indicated earlier, Boise Cascade reported a $16.8-million loss for the first quarter, compared with a profit of $33.6 million in first-quarter 1990. The company said it suffered from price erosion for most of the

U.S. paper/products industry results.

	First-quarter 1991 ($000)			
Companies	Sales 1991	% change 1991/90	Earnings 1991	% change 1991/90
Badger Paper Co. Inc.[1]	$18,778	−1.1%	$1,413	139.8%
Boise Cascade Corp.	992,730	−6.9	(16,850)	NM
Bowater Inc.	324,488	−4.1	16,737	−24.6
Champion International Corp.	1,164,812	−9.3	14,786	−78.8
Chesapeake Corp.	198,439	−2.5	2,449	−44.7
Consolidated Papers Inc.	229,630	−4.5	25,639	−36.4
Federal Paper Board Co. Inc.[1]	331,822	4.7	27,899	−28.1
Fort Howard Corp.	272,954	2.3	(26,772)	NM
Gaylord Container Corp. (2nd Q)	173,200	7.2	(12,700)	NM
Georgia-Pacific Corp.[1]	2,778,000	4.5	(7,000)	NM
P.H. Glatfelter Co.	149,106	−5.9	20,525	2.8
International Paper Co.	3,100,000	−3.1	132,000	−26.7
James River Corp.[1]	1,169,510	−18.8	39,398	−21.1
Kimberly-Clark Corp.	1,667,600	6.0	120,300	2.6
Longview Fibre Co. (1/31)[1]	152,355	−8.7	1,458	−88.7
Louisiana-Pacific Corp.	362,400	−23.7	(8,600)	NM
Mead Corp.	1,097,200	−3.8	13,400	−66.1
Mosinee Paper Corp.[1]	49,485	−12.2	417	−85.5
Pentair Inc.	289,100	0.9	7,375	30.5
Pope & Talbot Inc.[1]	132,066	−11.4	2,149	−80.5
Potlatch Corp.	293,577	−10.1	9,627	−74.0
Scott Paper Co.	1,234,200	−4.0	29,300	−51.2
Sonoco Products Co.	407,661	1.0	22,860	−7.9
St. Joe Paper	134,839	−16.3	2,893	−76.7
Stone Container Corp.	1,336,800	−8.0	1,300	−96.5
Temple-Inland Inc.	606,900	−2.7	42,100	−32.3
Union Camp Corp.	722,129	2.9	41,239	−38.8
Wausau Paper Mills Co. (2/28)[1]	81,309	1.5	6,700	34.3
Westvaco Corp. (1/31)[1]	573,343	−2.1	16,574	−64.3
Weyerhaeuser Co.	2,062,665	−9.6	52,403	−59.7
Willamette Industries Inc.	461,184	−1.9	5,451	−87.2
Total	**$22,599,282**	**−4.1**	**$584,470**	**−53.9%**

1. Income after taxes, from continuing operations. ( ) = losses. NM = not meaningful. **Badger Paper Mills.** 1990 income was adjusted upwards by $1.4 million for the cumulative effects of a change in accounting for income taxes. **Federal Paper Board.** 1991 income includes after-tax gain of about $3.2 million on the sale of its mechanical packaging operations. **Georgia-Pacific.** 1991 results include $43-million after-tax gain on sale of containerboard and packaging assets. **James River.** 1991 results do not include operations slated for divestiture as part of a restructuring plan announced in August 1990. The two quarters are not directly comparable, the company said. **Longview Fibre.** 1991 income includes pretax gain of $2.3 million on sale of assets. **Mosinee Paper.** 1991 includes charge of $1.9 million for incentive and deferred compensation plans. **Pope & Talbot.** 1990 results include net restructuring gain of $3.1 million. **Wausau Paper Mills.** 1990 results include life insurance proceeds of $1.9 million, related to the death of CEO William L. Goggins in December 1989. **Westvaco.** 1991 income includes $25-million pretax charge related to cost reduction programs.

grades it produces and also was impacted by poor office products markets, higher Pacific Northwest wood costs, and increased depreciation expense for its expansion program. Unless market conditions quickly improve, Boise said it expects financial results to dip further in the second quarter, especially because of the full-quarter effects of recent price decreases.

Higher volume and reduced energy costs were positive developments in the quarter ending Mar. 31 for Gaylord Container Corp., but they were not enough to offset the effect of lower prices and higher interest expense as the company reported a $12.7-million profit loss in its second fiscal quarter compared with a loss of $12.5 million in the same quarter of 1990. The company said that it was additionally hampered by the temporary idling of board machines at its mill in Antioch, Calif.

In that light, a 26.6% decline in earnings to $132 million reported by International Paper Co. in first-quarter 1991 compared with the same period in 1990 appeared to be a strong performance, given the difficult operating conditions. The company said that geographic and product diversity and expanded manufacturing of value-added items continued to serve it well despite erosion in its wood products and printing/writing paper businesses. International Paper's sales slipped 3.1% in the first quarter to $3.1 billion, the company said last month.

Containerboard difficulties. Major containerboard producers were hurt by sharply lower prices in the first quarter. However, Union Camp Corp. CEO Gene Cartledge said that "domestic box shipments held up well during the period, and we continued to experience strong export demand for linerboard, with first-quarter shipments up 15%." The company reported a 39% drop in profits for the first quarter from a year earlier. Profits were also hurt by an industry-wide decline in white paper prices due to new capacity entering the market, he said.

Similar factors caused a surprising 87% decline in profits for Willamette Industries Inc., which the company said were "market related" and did not reflect operating problems.

Stone Container Corp. reported it had close to break-even profits for the first quarter, but chairman and CEO Roger W. Stone expressed optimism that his company's markets were at the bottom of the cycle. "The economic need for price increases or restorations is great, and with anticipated high operating rates, strong export sales, and reasonable growth in capacity, we believe that within 12 months or so containerboard mills should be sold out."

The company said that it looks toward 1992 for relief from poor newsprint markets. Interest costs from the $2.7 billion in debt related to Stone's 1989 acquisition of Consolidated-Bathhurst Inc. continue to hurt results.

Significant improvements at its new kraft market pulp mill in Tennessee and its Nova Scotia newsprint mill were the highlights of a tough quarter for Bowater Inc. Although newsprint margins showed some improvement, the company said, U.S. consumption was down sharply in the first two months of 1991. The company added that dollar exchange rates will be a key to lifting newsprint and market pulp exports in the coming year.

Coated paper free-fall. Depressed pricing on coated paper markets and weak volume in all communications papers grades hurt James River Corp., which also suffered from increased competition in its retail tissue business. The company is pulling out of the specialty paper and coated freesheet printing paper markets and reported that its sale of the Specialty Papers Business to AEA Investors Inc. is progressing on course and should close soon. Consolidated Papers Inc. reported weaker demand for coated printing paper brought on by a decline in magazine ad pages and a postal rate increase that took effect in February.

Some winners. Lower pulp prices cut into profit margins for many producers, but they proved beneficial to Wausau Paper Mills, which had record quarterly earnings and net sales in its second quarter ending Feb. 28. Wausau cited the smooth operation of its mills and its aggressive capital spending programs for the strong performance. The company will continue to focus on its specialized market niches, according to CEO Arnold M. Nemirow. "This strategy has generated healthy financial results and should allow us to perform well even during the current economic downturn," he said.

Also showing profit growth in the quarter was Pentair, which enjoyed strong demand for its recycled Cross Pointe paper. A "growing acceptance" of supercalendered publication paper helped offset the pricing weakness in coated paper markets, Pentair commented. Continued decline of market pulp prices will further assist business, Pentair said, especially with increased demand expected from election activities and Olympic events in 1992.

The first-quarter operating earnings for Weyerhaeuser Co.'s forest products sector dropped 67% to $40 million, but the company found solace in a mere 1% earnings decline in its pulp, paper, and paperboard business, which reported improvement in fine paper, newsprint, and bleached paperboard.

Tissue more competitive. Higher results from worldwide tissue operations offset weak demand for publication paper, resulting in a 51% profit decline for Scott Paper Co. in the first quarter. "Strong competitive activity" across its U.S. tissue business was more than offset by the healthy performance of its international operations, the company said. European earnings increased 70%, Scott said, primarily due to improvements in the U.K. and with the Scott-Feldmühle joint ventures formed in fourth-quarter 1990.

However, weak demand and repairs to a recovery boiler at the Skowhegan, Maine, mill caused the S.D. Warren Div. to report an 86% drop in income from operations for the first quarter. Because of the weak demand, the company said it could not "fully utilize its recently completed capacity additions" at the S.D. Warren Div. and was continuing selective machine curtailments begun late last year.

Kimberly-Clark reported the best sales growth of the quarter on the strength of its personal hygiene products and overseas consumer products businesses, and it was the second most profitable paper company, following IP. K-C's recent attempt to enter the southern premium bathroom tissue market has led to modest discounting, according to an industry analyst.

Fort Howard Corp. again posted a deficit related to interest expense and financing costs of its 1988 leveraged buyout. ■

Canadian industry posts massive losses

Despite some benefit from belt tightening measures, first-quarter 1991 sales for the Canadian pulp and paper industry tumbled and only two companies reported making any profit growth at all. A *Pulp & Paper Week* survey of 19 Canadian forest products companies showed a net loss of C$183.6 million compared with a gain of C$126.6 million in the first quarter of 1990. Sales dropped 13.2% for the companies surveyed to C$5.3 billion, a sign that the recession in North America may last longer than thought even two months ago.

The Canadian pulp and paper industry appears to be experiencing its worst recession since the 1930s, with rampant mill closures, machine shutdowns, worker layoffs, and asset sales from the Maritimes to British Columbia. Only two Canadian companies in the survey, Rolland Inc. and Scott Paper Ltd., reported profit growth in the first quarter.

"It's quite a bit worse than 1982-83," said an analyst in Montreal, Que. "The East was at least making some money then." And the second quarter of this year is expected to be even worse.

Part of the poor picture is that current performance is being compared with the opulence of 1988 and 1989, when earnings records were broken, noted Wood Gundy Inc. analyst Rob Duncan. Now the cyclical misfortune of newsprint and market pulp businesses, which make up about 75% of the Canadian paper industry's output, has combined with a higher Canadian dollar compared with U.S. currency. Required environmental and recycling-related upgrades are making dramatic demands on limited cash flow as Canadian companies struggle to cut costs and remain competitive with their U.S. and Scandinavian rivals.

Doldroms in the East. Recent improvements in housing markets in Canada and the U.S. are not expected to be enough to lift Noranda Forest Inc. from red ink this year. The company suffered a C$38-million loss in the first quarter, compared with a C$6-million gain a year ago. Capital spending was trimmed 50% to C$70 million in the first quarter and is expected to be reduced to less than C$383 million this year from C$569 million in 1990. Cascades Inc. anticipates cutting capital spending to C$75 million in 1991 compared with C$93.4 million last year.

Many industry executives point fingers at government policies that prop up interest rates, tax lumber to the U.S., and jack up stumpage fees in the West. Noranda Forest chairman Adam Zimmerman called for the government to devalue the Canadian dollar and put a freeze on both federal spending and wage increases to pull the country out of the recession. "With our industry base disappearing," Zimmerman said, "surely times call for an emergency response."

Abitibi-Price Inc. said its first-quarter cash flow improved but the company again lost money, posting a C$5.5-million decline compared with a loss of C$11.3 million in the same quarter of 1990. Office products and converted products continue to be profitable, Abitibi-Price said, with improved operating efficiencies and asset sales also helping to reduce last year's loss. "Our restructuring efforts to reduce costs have produced annual savings of almost $30 million," said Abitibi-Price chairman Bernd K. Koken. But the company warned that oversupply will continue in its paper markets and significant newsprint downtime will be taken.

"On the whole, the short-term industry outlook is not promising," said Paul E. Gagn, president and chief operating officer of Canadian Pacific Forest Products Ltd. "Although I believe there is room for guarded optimism, I know there is also a lot of hard work ahead for us." CPFP reported a loss of C$50.1 million in the first quarter, compared with a profit of C$4.8 million in 1990. Newsprint markets should continue to feel the effects of the weak economy and overcapacity, while overseas markets are expected to remain strong. The company anticipates limited market growth in paperboard and packaging and in white paper markets, and even its tissue business is expected to be impacted by new capacity and increased competition. CP Forest announced recently it will invest C$210 million in a thermomechanical pulp mill and paper machine improvements at its Gatineau, Que., newsprint facility. A C$350-million modernization program at its Thunder Bay, Ont., newsprint mill is nearing completion, the company said, and startup of both facilities is scheduled for this year.

Domtar Inc. CEO Pierre Desjardins

Canadian paper/products industry results.

Companies	First-quarter 1991 (C$000) Sales 1991	% change 1991/90	Earnings 1991[1]	change 1991/90
Abitibi-Price Inc.[1]	$726,400	−7.4%	(5,500)	NM
Canadian Pacific Forest Products Ltd.[1]	526,100	−15.6	(50,100)	NM
Canfor Corp.[1]	213,600	−10.9	(10,700)	NM
Cascades Inc.	217,816	10.9	$821	−77.7%
Crestbrook Forest Industries Ltd.	37,701	−38.9	(2,483)	NM
Doman Industries	122,976	−22.6	(10,105)	NM
Domtar Inc.	450,000	−26.4	(28,000)	NM
Donohue Inc.	131,200	−17.1	(1,300)	NM
Fletcher Challenge Canada Ltd.	267,000	−5.3	(10,700)	NM
MacMillan Bloedel Ltd.	677,800	−13.3	3,800	−87.3
Noranda Forest Inc.	1,030,000	−14.0	(38,000)	NM
Perkins Papers Ltd.	18,511	0.0	531	−27.8
Repap Enterprises Corp. Inc.	274,200	−6.5	(17,500)	NM
Rolland Inc.	84,727	−22.1	313	79.9
Scott Paper Ltd.	118,120	−9.2	4,696	7.5
Slocan Forest Products	39,900	−27.3	(4,100)	NM
Tembec Inc. (2nd Q)	59,421	6.7	417	−91.2
Weldwood of Canada Ltd.	159,000	−0.6	(7,500)	NM
West Fraser Timber Co.	101,400	−27.9	(8,200)	NM
Total	**$5,255,672**	**−13.2%**	**(183,610)**	**NM**

1. Income after taxes, from continuing operations. ( ) = losses. NM = not meaningful. **Abitibi-Price.** Some 1990 figures have been restated. 1990 income earnings include pretax charge of $13.7 million. **Canadian Pacific Forest Products.** 1990 sales restated. **Canfor Corp.** 1991 earnings include gain of $5.8 million from insurance proceeds following a fire at its Fort St. James, B.C., sawmill.

estimated that the company's loss for 1991 could be C$100 million. The company lost C$333 million in 1990, including C$237 million in restructuring charges. Domtar lost C$28 million in the first quarter, compared with a C$10-million loss in first-quarter 1990. The company is not currently in any negotiations to sell any of its units, Desjardins said. "This would be the worst time to sell any businesses," he added. As of June, Domtar will have laid off 1,300 salaried positions, reducing its white collar work force to 3,200 while eliminating its union work force by 500 to a total of 9,500 employees by later this year.

The East's only success story this quarter, Rolland, attributed a robust 80% increase in quarterly earnings to increases in manufacturing efficiency even though revenue fell dramatically because decor paper sales are no longer consolidated.

Woes in the West. Although Canfor Corp. reported a loss of C$10.7 million in the first quarter compared with a gain of C$13.1 million in 1990 and appeared likely to end in the red for the year, the company said it appears to have survived the worst. "I think we may have turned the corner," Canfor chairman Peter Bentley told the *Globe and Mail*. Canfor's business is heavily oriented to the do-it-yourself construction market and has seen a turnaround in March and April. "I think that's a good reflection of economic activity in general," Bentley said. But business will remain difficult, he warned, with lumber prices still "not great" and no relief from British Columbia's high stumpage fees.

Fletcher Challenge Canada Ltd. said it will continue to study previously announced plans to sell or set up joint ventures for its sawmills, sell its 45% stake in Donohue St-Felicien Inc., and find an equity partner for its Crofton, B.C., pulp and paper complex in the wake of a C$10.7-million loss in the first quarter, compared with a C$15.7-million gain in 1990.

MacMillan Bloedel Ltd. topped western Canadian sales, although its revenue dipped 13% to C$677.6 million. It managed a C$3.8-million profit in the quarter, 87.3% below the same quarter in 1990. CEO Robert Findlay said hopes that consumer spending would pick up when the Persian Gulf war ended proved false, and newsprint and market pulp sales will suffer for the next year or so. ■

UNCOATED FREE-SHEET

G-P ramps up Ashdown machine in sickly market

Last month, Georgia-Pacific Corp. started up its new 325,000-tpy uncoated free-sheet paper machine at Ashdown, Ark., at a time when the market is still suffering weakened demand and plunging prices. No. 64 machine was scheduled to "be making product" the day after startup began May 2.

No. 64 is a 4,000-fpm, 388-in. Beloit machine, with a Concept III headbox, Bel-Form top wire, Tri-Nip press, and blade-metering size press. The unit also sports an AccuRay 1180 Micro-Plus control system.

The weak market is characterized by exceptionally low prices for commodity (or near-commodity) grades that will be produced at Ashdown. A number of uncoated free-sheet paper producers already had taken market-related downtime. Boise Cascade Corp. took downtime system-wide, while James River Corp., G-P, International Paper Co., and P.H. Glatfelter Co. also shut down machines, though some mills are attributing the downtime to maintenance. Usually this maintenance is scheduled for a little later in the year.

Of course, G-P's isn't the only new machine to start up within the last year or the last for the next six months. Union Camp Corp. will ramp up its 240,000-tpy unit at Eastover, S.C., sometime in mid-year, probably in June. Also aimed at the U.S. markets is tonnage from a 100,000-metric-tpy machine due online in Anahuac, Mexico, at the integrated pulp mill owned by Celulosa de Chihuahua, part of the Ponderosa group. Brazilian papermaker Celpav will ramp up its 150,000-metric-tpy machine at about the same time as Bahia Sul starts up its 230,000-metric-tpy unit. ■

K-C sets rebuild of Whiting machine

Kimberly-Clark Corp. plans to rebuild substantially its No. 4 uncoated free-sheet machine at Whiting, Wis., to triple the machine's capacity. The rebuild will create a virtually new machine and is scheduled for startup in May 1992. Cost and capacity figures were not released. This is the third major expansion within five years at the mill.

Whiting produces a variety of uncoated paper grades on four paper machines. Among the Whiting mill's products are Neenah Paper's recycled grades, which contain a minimum of 15% postconsumer waste. The grades are Classic Laid in 24-lb writing, 75-lb text, and 80-lb cover; and Environmental 25 writing, text and cover, which is touted as 100% recycled fiber with 15% postconsumer. This recycled line is the fastest growing in the history of Neenah Paper. A spokesperson was not able to say if the rebuilt No. 4 machine will produce recycled paper. The estimated capacity at Whiting is 120 tpd. ■

MARKET PULP

Alberta-Pacific pulp mill construction nears

Construction was expected to begin by last month on Alberta-Pacific Forest Industries Inc.'s bleached kraft pulp mill near Athabasca, Alta., said public relations counsel Brian Hetherington. Parent company Crestbrook Forest Industries Ltd. has lined up two partners to share the C$1.28-billion project: MC Forest Investment Inc. and Kanzaki Paper Canada Inc., a unit of Kanzaki Paper Manufacturing Co. of Japan. Crestbrook will retain a 40% interest, MCFI 35%, and Kanzaki 25%. MCFI is a subsidiary of Mitsubishi Corp., which will buy the new mill's pulp, according to the *Globe and Mail*, and Crestbrook is owned by private investors and Mitsubishi and Honshu Paper Co. The partners will be involved in financing the project. Funding will also come from a consortium of Canadian and international banks, and the provincial government will put up C$350 million in debenture loans. The 1,500-metric-tpd mill is due online in mid-1993. ■

Mechanical Pulping Projects Getting Less Attention in the 1990s

The market pulp boom is winding down, while demand for recycled fiber cuts expansion at integrated mills

By CARL ESPE, News Editor

The number of mechanical pulping expansion and modernization projects has declined over the past two years as a big new wave of market pulp capacity has come online in Canada and as integrated paper mills all over North America have scrambled to add deinking capacity to meet new demand for recycled newsprint and other papers. Together, these two trends have sharply cut back expansion in the mechanical pulp mill.

U.S. mills plan to add just 62,000 tons of net new mechanical pulp capacity over the 1991-93 period, according to the latest American Paper Institute (API) survey of capacity, an average of 0.3% a year. Over the 1980-90 period, in contrast, growth averaged 3.1% a year. New installations will add 162,000 tpy during the 1991-93 period, offset by the loss of 99,000 tons of existing capacity.

Integrated mills have cut back sharply on expansion plans for mechanical pulping in favor of projects to add wastepaper processing facilities. In 1989, mills told API that they would raise mechanical pulp capacity to almost 7.37 million tpy by 1992. In the 1990 survey, those plans were revised downward drastically, and now capacity is expected to reach 6.93 million tpy by 1993, about 437,000 tpy less than previously expected.

In Canada, the 1980s were explosive years for mechanical pulp, and the expansion boom will carry forward into the early 1990s for market pulp. Capacity growth averaged 15.2% a year during the 1979-89 period for market mechanical pulp, according to the Canadian Pulp & Paper Assn., raising overall capacity from a low of 240,000 metric tons in 1980 to 1.1 million tons in 1989. Growth will continue at a strong 13.7% rate through 1992. At integrated mills, capacity for stone groundwood pulp fell an average of 3.5% annually, but the decline was more than offset by new capacity for thermomechanical pulp (TMP), which climbed almost 23.2% a year. As in the U.S., however, deinking will cut into mechanical pulp expansion in the early 1990s, lowering the growth rate for TMP to 13.1% over the 1989-92 period.

Six new market bleached chemi-thermomechanical pulp (BCTMP) lines came online from 1988 to 1990 in Canada, and two more are scheduled for completion in 1991 and 1992. Producers have had a hard time finding new markets for their product, however, a task complicated by the boom in new capacity and the decline in prices for competing bleached kraft pulp grades. Nevertheless, industry observers say aspen BCTMP sales are going strong even though softwood BCTMP producers appear to be suffering, with outright closures looming.

ASPEN PROJECTS. Slave Lake Pulp Corp.'s 110,000-metric-tpy mill in Alberta went online in December and is meeting expectations. The C$182-million joint venture between Alberta Energy and MoDo Canada will supply high-grade printing/writing export markets, with about 25% of production going to North America.

Louisiana-Pacific Canada Ltd.'s new Chetwynd, B.C., mill is currently starting up, said M.B. (Mel) Mountain, general manager-pulping. The C$150-million facility will turn out 157,500 metric tpy of aspen BCTMP for the printing/writing paper market. He said that while "there is no great demand for the fiber now, we feel there is room to absorb it in the part of the market our fiber is going into. We feel the pulp market has bottomed out." As for softwood BCTMP, he expects it will find a home in grades such as newsprint and toweling.

Tembec Inc. is aiming to start up its second softwood/aspen Temcell line in Temiscaming, Que., in September. Some BCTMP will go to its Temboard boxboard machine, but the new 150,000-metric-tpy Temcell II line will raise market BCTMP capacity to 200,000 tpy.

Shin Ho Canada Ltd. is still trying to get permits for a 1992/93 startup for a C$180-million, 160,000-metric-tpy aspen BCTMP pulp mill proposed for Thunder Bay, Ont., said Ken Shin, one of the firm's directors.

Vanderhoof Pulp & Paper Ltd. has finally won an aspen pulpwood agreement from British Columbia. Now the firm is working on a prospectus for the project, which has been previously described as a C$300-million BCTMP mill near Vanderhoof that might be built with Tembec. The company's next move is to enter the Major Project Review Process, a review involving the public as well as the federal and provincial governments. *(See table p. 50.)* ■

TABLE 1: **Mechanical pulping modernization and expansion projects.**

Start date	Cost ($ million)	Company, mill site	Additional information (short tons in U.S.; metric tons in Canada)
1990	—	Alabama River, Claiborne, Ala.	Three-line TMP plant for new $320-million, 220,000-metric-tpy newsprint mill, supplied by Sunds Defibrator; uses 23,000-hp CD 76 primary and secondary refiners and 12,000-hp RGP 60 rejects refiners
1991	—	Inland Empire, Millwood, Wash.	Two CTMP lines will be idled upon startup of a 108-tpd deinking plant, which will allow the mill to make 40% recycled-content newsprint for about half its 66,000 tpy output
None	—	James River, Arnheim, Mich.	A proposed $1-billion, 1,000-tpd coated paper mill, possibly including a CTMP plant, was indefinitely deferred in early 1990 in favor of recycled paper expansion on the West Coast
1990	—	James River, St. Francisville, La.	Installed a new Tampella pressurized groundwood system, the first ever applied to southern pine; a new LWC machine will be installed by 1993
None	—	Madison Paper, Madison, Maine	In early 1990, decided not to install new supercalendered paper capacity and expand pressurized groundwood pulp output; mill is considering adding recycled fiber capacity
1990	38.0	Niagara of Wis., Niagara, Wis.	Rebuilt groundwood pulp mill with new 280-tpd Tampella pressurized groundwood system; included Bailey Controls and Tamsec process controls, Kone Wood log handling and conveyor system, Andritz peroxide bleach plant
1991	300.0	North Pacific, Longview, Wash.	$300-million newsprint expansion includes upgrade of mill's nine TMP refining lines to raise efficiency and output by 20%, or about 94,000 tpy
1990	—	Alberta Newsprint, Whitecourt, Alta.	New $360-million, 220,000-tpy newsprint mill includes Voith CTMP plant
1991	85.0	Boise Cascade, Kenora, Ont.	Build new 470-tpd TMP mill and chip-handling facility, replacing about one-third of existing groundwood pulping operation and eliminating outside kraft pulp purchases; Sunds Defibrator is supplying new plant with two RGP 76 and one RGP 70 conical disc refiners
1992	210.0	Canadian Pacific, Gatineau, Que.	Build a new TMP mill to replace mill's stone groundwood, refiner mechanical, and SCMP systems and eliminate purchases of kraft pulp; project includes paper machine improvements and will result in downsizing of mill from 565,000 to 400,000 tons of newsprint produced from 60% TMP and 40% deinked fiber
1990	105.0	Canadian Pacific, Thunder Bay, Ont.	Built new 245,000-tpy TMP plant for newsprint expansion, replacing No. 1 groundwood mill and modernized No. 2 groundwood mill; new furnish is 45% TMP and 55% groundwood, sulfite, and semibleached kraft
1992	100.0	Cascades, Cabano, Que.	Build a new 120,000-tpy CTMP mill; engineering is complete, but project needs environmental approvals and financing
1990	240.0	Donohue, Matane, Que.	In late 1990, completed new 190,000-tpy market bleached CTMP mill with Rexfor; includes eight 12,000-hp, 64-in. single-disc refiners from Hymac, Du Pont Canada bleaching chemical equipment, Hymac and Ingersoll-Rand bleaching equipment
None	195.0	Fibreco Export, Taylor, B.C.	Double bleached CTMP capacity with another two-line, 180,000-tpy pulp plant; construction expected to begin in two years for completion in 1994
1993	18.0	Fraser, Edmundston, N.B.	Modernize groundwood mill with additional reject refining; in proposal stage
1991	—	Howe Sound P & P, Port Mellon, B.C.	New $355-million, 535-tpd newsprint mill includes a new TMP plant
1991	150.0	Louisiana-Pacific, Chetwynd, B.C.	New 157,500-tpy bleached hardwood CTMP mill with Hymac fiber line, Flakt fluff dryer, Hepburn presses; targeted at printing/writing paper market
1992	330.0	Millar Western, Meadow Lake, Sask.	Build new two-line, closed-loop, aspen-based 240,000-tpy market bleached CTMP mill; passed environmental review in 1990
None	—	Nortek Forest Products, Nipawin, Sask.	Plans to build new 100,000-tpy hardwood market pulp mill using high-yield steam-explosion Stake process fell through in mid-1990 when Kruger decided against joining the project
None	200.0	Orenda Forest Products, Stewart, B.C.	Negotiating financing for new 300-tpd market bleached mechanical pulp mill; closed-loop Tampella chemi-pressurized groundwood system would produce pulp with freeness of 60 CSf and 75 brightness for SC and LWC paper; CPGW system uses alkaline peroxide in the grinder hot loop to achieve first-stage bleaching, followed by a second bleaching stage
1990	147.6	Quebec & Ontario, Baie Comeau, Que.	Built a new 600-tpd TMP mill to replace an existing sulfite plant; Hymac supplied new PRMP system with nine 14,000-hp HSD 60 pressurized refiners
1992	110.0	Scott Paper, Crabtree, Que.	New 300-tpd bleached CTMP plant to supply Scott tissue mills in Quebec; mill will make softwood and hardwood pulp bleached with hydrogen peroxide and hydrochloride
None	180.0	Shin Ho Canada, Thunder Bay, Ont.	Seeking permits for new 160,000-tpy bleached hardwood CTMP mill, proposed for possible 1992-93 startup
1990	182.0	Slave Lake Pulp, Slave Lake, Alta.	Completed new 110,000-tpy market bleached CTMP mill to produce high-brightness pulp for printing/writing paper; Sunds Defibrator supplied pulping equipment, including a three-stage Conical Disc refiner
None	153.0	Stake Tech., Mont Joli, Que.	Progressing with plans to build a bleached hardwood pulp mill using high-yield steam explosion process; 1992 target
1991	40.0	Stone-Consolidated, Shawinigan, Que.	Expand TMP capacity 100 tpd and reduce sulfite pulp output by 25 tpd to help meet environmental standards for effluent; includes addition of a reject refiner, modifications for chip screen plant, TMP lines
None	195.0	Tackama Forest, Fort Nelson, B.C.	Proposed new 190,000-tpy market bleached CTMP mill; 1993 target
1991	120.0	Tembec, Temiscaming, Que.	Boost bleached CTMP capacity 150,000 tpy with a second pulping line, Temcell II; major equipment and high-brightness peroxide bleach plant from Sunds
None	300.0	Vanderhoof P & P, Vanderhoof, B.C.	Proposed bleached hardwood CTMP market pulp mill won an aspen pulpwood agreement recently from the province and must now undergo environmental review; company has been seeking industry partners

Use of Groundwood Furnish Driven by Sheet Quality, Environmental Factors

Recent installations indicate SC and LWC mills favor groundwood for bright, strong pulp at reduced chemical and energy cost

By KEVIN L. BURKETT and HARRI NERG

Groundwood printing papers represent the most efficient use of the forest resource for paper manufacture. The high scattering coefficient of mechanical pulps provides high opacity at relatively low grammage. These grades are primarily used in advertising printing and have experienced very healthy demand growth in the last ten to 15 years.

This trend is expected to continue in the 1990s. However, demand for some grades will grow much faster than others. The trend in developed countries is toward higher-value-added products, higher quality, and market segmentation/diversification. This is demonstrated by more use of color in printing, increased use of coating and fillers, and a wider range of grades (e.g., brightness, finishes, and basis weights).[1]

The high costs and environmental issues associated with the manufacture of chemical pulps have driven the development of processes that will produce a substitute for these pulps in most grades of paper and tissue. During the early 1970s, the thermomechanical pulp (TMP) process became so popular that many industry analysts began to seriously doubt the future of the groundwood process.

The ability of TMP to consume sawmill residues and produce byproduct steam for use by an integrated paper machine made it particularly attractive for newsprint production. Its further development into chemi-thermomechanical pulp (CTMP) and other chemi-alphabet pulps further threatened the future of groundwood.

The drive to develop the chemical replacement, or reinforcement pulp, has made significant progress. As a reinforcement pulp, CTMP strength properties are beneficial. However, the production of fine printing grades, particularly coated grades, requires properties that refiner pulps do not easily attain.

For example, low fines content means that for lower-basis-weight paper grades, both porosity and sheet surface roughness increase. Light scattering coefficient and opacity are reduced. It is in this area that groundwood pulps find their niche. Groundwood is often referred to as a "filler" pulp, but this term is misleading; it is a "printing" pulp. For this reason more than any other, groundwood systems still exist.[2]

The groundwood process is more than 150 years old, and during the period of intense development of refiner-mechanical pulp systems, comparable development of the groundwood process was minimal. To compete with new refiner systems, improvements in groundwood technology were necessary.

Advances in control systems have reduced staffing requirements and increased pulp quality uniformity. The development of the pressurized groundwood (PGW) process certainly played a role in groundwood's return to respectability. PGW offers significant strength improvements over stone groundwood (SGW) without sacrificing any optical properties or increasing energy requirements.

ST. MARY'S PAPER. In 1987, St. Mary's Paper Inc., Sault Ste. Marie, Ont., initiated an expansion/modernization project designed to ensure the mill's future in an increasingly competitive marketplace. At that time, St. Mary's produced 82,000 tpy of SC-B paper and 32,000 tpy of 70 brightness machine-finish (MF), clay-filled paper.

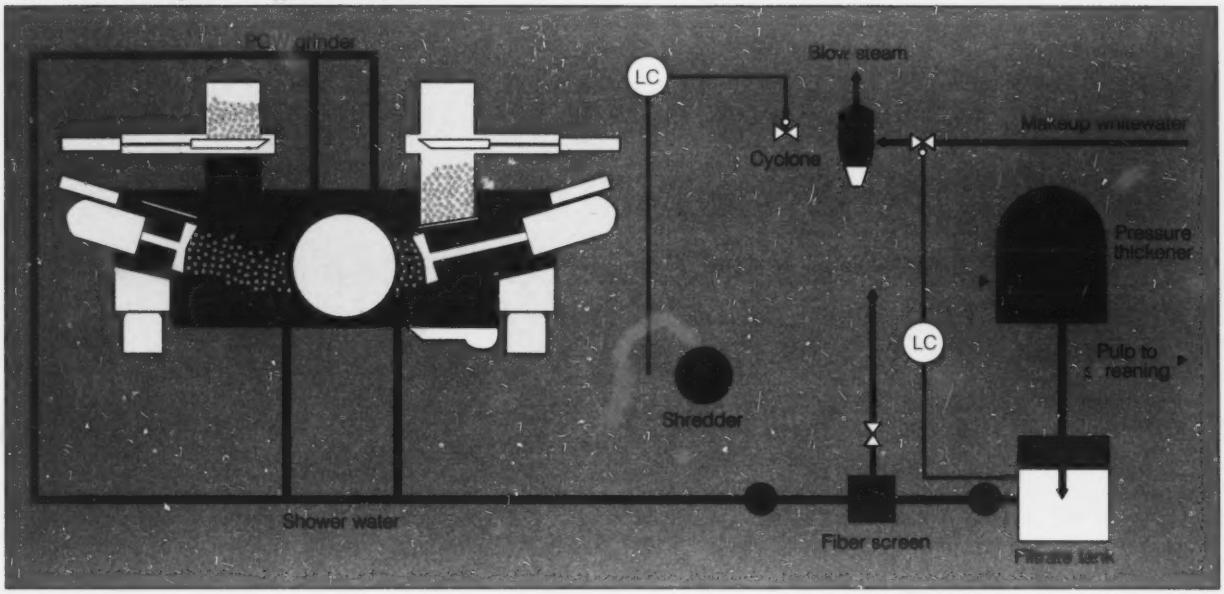
The mill installed a new twin-wire machine, PM 5, with a trim of 4.67 m (184 in.). St. Mary's realized the potential demand for its product and wanted a machine capable of producing SC-A grades if it chose to enter that market.

In addition to PM 5, the $157-million expansion program included two supercalenders, another winder, and additional groundwood capacity in the pulp mill. Commonwealth Construction was chosen to provide the turnkey installation of the machine, and Tampella was selected to supply the new machine and new grinders. In addition, the groundwood mill screen room was re-

Mr. Burkett is sales engineer and Mr. Nerg is product manager, Tampella Paper Machinery Inc., Atlanta, Ga.

This article was presented at the CPPA Mechanical Pulping Committee Meeting in Sault Ste. Marie, Ont., Mar. 19, 1991.

FIGURE 1: **Flow diagram of a typical PGW process.**



configured with the addition of four new Centrisorters and a new Bird five-stage centrifugal cleaner system to improve pulp quality significantly.

PM 5 was designed to be one of the world's fastest supercalendered (SC) paper machines, with a design speed of 1,400 m/min (4,600 fpm) and a planned operating speed of approximately 1,200 m/min (4,000 fpm). It is the first machine installed in Canada designed specifically to produce SC paper grades. PM 5 has a headbox slice width of 5.04 m (198.4 in.) and a trim of 4.67 m (184 in.). It is designed to run a furnish consisting of 68% SGW, 20% semibleached kraft, and 12% clay. It will operate in a grammage range of 42 to 60 g/m² (28 to 40 lb/3,300 ft²), with a design grammage of 50 g/m² (33.5 lb/3,300 ft²). Target production is 375 tpd.[3]

The existing 1950s-vintage groundwood mill consisted of four Koehring Waterous grinder lines (Nos. 1 through 4), each equipped with two 1.7-m- (67-in.-) dia × 1.4-m (54-in.) face stones driven in tandem. Wood in 1.2-m lengths was hand-fed to these four grinders by a crew of seven per shift from a conventional water flume arrangement.

As part of the modernization, four Tampella T-1812 atmospheric grinders were installed. The grinders, in tandem arrangement, are equipped with 1.8-m- (71-in.-) dia stones with 1.5-m (57.9-in.) faces. The tandem lines are driven by C.G.E. 10,500-kW (14,000-hp), 300-rpm motors. Each grinder is equipped with electrically driven stone sharpening lathes.

An FMP-Rauma automated wood-feeding system has been installed on all grinders except No. 1, which will be held in reserve and hand-fed when required. Fully operational, the capacity of the groundwood mill will be 600 tpd. Staffing requirements are three to four people per shift.

The groundwood mill at St. Mary's has been retrofitted with a modern process control system. There are three components in the control system: a Measurex Vision 2002 DCS (distributed control system), an Allen-Bradley PLC (programmable logic controller), and a local control panel. The Vision system controls the grinder load system, the peak load control system, and the grinder shower water flow. The PLC controls the pocket charging system and the lubrication and hydraulic system controls. These systems can be accessed through the Vision terminal. The local control panel acts as an interface with the operator.

Decreased maintenance and staffing requirements have been the most significant benefits associated with the pulp mill modernization.

LAKE SUPERIOR PAPER. Lake Superior Paper Industries began making paper in November 1987 in a state-of-the-art greenfield SC-A papermaking complex at Duluth, Minn. It is a joint venture of subsidiaries of Pentair Inc. and Minnesota Power. LSPI has the capacity to produce 240,000 tpy of SC paper.

After extensive study, the PGW process was selected to produce mechanical pulp for the mill's single Voith Duoformer paper machine. The Tampella PGW process differs from conventional grinding in two respects:

- The grinding occurs under overpressure.
- The shower water temperature is high—e.g., in excess of 90°C.

Pulp from the pressure grinder passes through the shredder (which reduces slivers to matchstick size) to

an atmosphere blow cyclone. The flash steam from the dilute pulp suspension (1.5% Cs) is separated in the blow cyclone and can be utilized in heat recovery systems. Pulp from the cyclone, at 100°C, is delivered to a thickening stage.

Most of the hot filtrate is recovered and recirculated back to the grinders as shower water. This hot shower water circulation is a completely closed system and is described as the "hot loop" (Figure 1). Shower water temperature can be maintained at more than 90°C without any external heat makeup.

At LSPI, the hot loop includes six Tampella T-1812P pressure grinders. Each grinder is equipped with a 7,000-hp synchronous motor rotating at 327 rpm. All of the equipment within the hot loop is controlled through a PLC-based Tamsec system. Since a variety of different control modes can be employed simultaneously on different grinders, freeness and quality control are greatly enhanced. The pulp mill is designed to produce 420 oven-dry short tpd at 60 CSf.

From the project's inception, the owners were determined to build a mill that was modern not only in its design and technology but also in its social systems. LSPI has employed a sophisticated team management concept since day one. Before the mill opened, LSPI recruited skilled operating managers and technicians to form an 81-person core group of experienced papermakers with average industry experience of 12 years. Other technicians were recruited locally, and two-thirds of the 323-person mill staff came from the Duluth area.

Jack LaVoy, vice president of government and public relations for LSPI, explains that cooperative management stresses consensus building. Instead of obeying direct orders handed down from a supervisor, each "team" contributes the knowledge and experience of its members to the process of problem solving and goal setting by consensus development. "It takes more time to reach a decision, but that decision is better than ones arrived at by individuals," LaVoy said.[5]

Being a team member is just the beginning for employees at the Duluth mill. In addition to mastering the skills necessary to do their own tasks, LSPI technicians are expected to develop related skills through the mill's "demonstrated performance" system.

"People earn additional base pay by learning new skills," said LaVoy. "Each team member is encouraged to develop two to four skills other than their base skill. That gives them the opportunity to have a more interesting work life, and it gives the mill more flexibility in mill staffing. Therefore, the need for spare crews and vacation relief is eliminated."

Pulp strength properties were maintained and smoothness and porosity improved significantly with PGW. Bleach brightness improved without a loss in opacity.

BLANDIN PAPER. Blandin Paper Co. has been in the business of making groundwood-based paper since the turn of the century. It is a single-site mill located on the Mississippi River, about 75 miles northeast of Duluth and about 125 miles due south of International Falls, Minn.

Blandin Paper is a subsidiary of Fletcher Challenge Canada Ltd., which in turn is owned by Fletcher Challenge of New Zealand, an ownership that is indicative of the continuing global integration of the forest products industry.

Blandin is a direct sales mill with sales offices in Chicago, Ill., and New York, N.Y., handling its web offset and rotogravure grades, principally No. 5 lightweight coated (LWC).

In summer 1989, Blandin completed a $350-million expansion. Included in the expansion were a new woodroom, PGW mill, LWC paper machine, shipping area, and clay preparation area.

Blandin's new woodroom was designed for separate processing of hardwood (HW) and softwood (SW) species, located in proximity to a modern cogeneration plant installed in 1980. Fall-down from wood preparation provides fuel to this facility.

The new PGW mill, which started up in July 1989, is located next to the new woodroom. Tampella supplied nine pressure grinders with auxiliaries, a Tamsec grinder automation system, a fully automated Kone Wood log charging system, three Rauma-Repola pressure-washer-thickeners, and 16 Tampella pressure screens.

The Tampella grinders are equipped with the latest development in grinder automation—computer-aided pulpstone lathes. The new mill, in addition to being the largest PGW mill for LWC grades, is one of the world's most modern, with fully automated log feeding and grinder control.

The pulp mill layout is for ten grinders, with nine in the initial delivery. Five grinders are dedicated to aspen, with the remaining four to spruce/balsam. The grinders are in a tandem drive arrangement, with power supplied by one 14,000-hp and four 13,000-hp motors. Peak production of the new PGW mill using ten grinders is 650 bone-dry short tpd. Average specific energy consumption for aspen (150 ml. CSf at pit) is 1,000 kWh/ton, and for spruce/balsam (100 ml. CSf at pit), 1,250 kWh/ton is typical.[6]

The new PGW mill replaced existing softwood SGW (140 tpd) and hardwood TMP (165 tpd) systems. Blandin selected the PGW process for the following reasons, in order of importance:[7]

1. Improved quality
   A. Print smoothness
   B. Pick strength

C. Brightness
D. Tear strength
2. Cost efficiency
A. Energy
B. Bleaching chemicals
C. Kraft savings.

The pulp evaluation averages show significant improvements in the properties that are traditionally associated with pressroom runnability and printability. Pulp strength properties were maintained and smoothness and porosity improved significantly with PGW. Bleach brightness improved without a loss in opacity. This confirms results obtained earlier in the pilot plant, and the option is open to seek further improvements by alkaline peroxide additions to the PGW hot loop.

Of particular interest is that PGW provides even better quality improvements on pine than . . . on spruce—for example, a 100% improvement in tear strength.

Progress on CPGW was recently reported in a paper by Haikkala et al.[8] The experience at Blandin in replacing TMP with a modern groundwood pulp is similar to that reported by Jensen et al. in 1989.[9] In that comprehensive pilot-plant-scale study using *Pinus radiata*, the PGW furnish provided superior opacity, brightness, porosity, and smoothness to competing mechanical pulping processes.

LWC groundwood printing papers have stringent quality standards. The decision to use PGW to modernize and expand the pulping capacity at Blandin was the result of several years of planning, which included pulping trials conducted at the Tampella Research Center at Inkeroinen, Finland. In particular, the opportunity to obtain a high-quality papermaking furnish from an overmature wood resource was a significant benefit.

The modernization project included the replacement of PM 1, a small, 32,800-ton 1900 vintage machine. Pressroom paper samples of several grades were sent to an independent laboratory for testing. All of the mechanical pulp in these pressroom samples, representing up to 67% of the furnish, consisted of PGW.

NIAGARA PAPER. Niagara of Wisconsin Paper Corp. in Niagara, Wis., a subsidiary of Pentair Inc., is 101 years old this year. However, its production is strictly state of the art. Niagara produces high-quality groundwood printing papers marketed under the trade names of Niagara Book, Pentair, and Penagara. The mill's production is targeted for 720 tpd of Nos. 4 and 5 coated papers, with basis weights ranging from 40 to 70 lb/3,300 ft^2.

PGW pulp was produced at Niagara Paper for the first time in February 1990. The new 280-tpd PGW system is part of an overall plan to continue the modernization and expansion of the Niagara mill. On completion of the PGW project, five existing atmospheric grinders were shut down. The system, which includes four T-1812P pressure grinders, is housed in a new building. Each of Niagara's grinders is driven by a 7,000-hp (5-MW) motor. The nominal log length is 4 ft (1.2 m), and the furnish is 100% aspen.

A 100-ton-capacity, live-bottom bin supplied by Kone Canada is interconnected by supply conveyors to automatically deliver wood to the grinder charging system. Wood charging to the grinder pockets is done with a fully automated Kone system supplied by Tampella. Grinder casing design pressure is 34 psi (3 bar), and target pit freeness is 180 to 200 CSf.

Internal PGW process heat recovery within the pulp mill hot loop is by Hedemora low-pressure disc filter. The diluted pulp from the new system is pumped to an existing screening and reject handling system, which was rebuilt and modernized.

Grinder control is automated with the standard Tampella Tamsec system, which also provides process reports. This system provides the mill with detailed control of the grinders and auxiliary system and with advanced methods of controlling the grinding. From the start, the mill has used the "programmed shoe speed" mode of operation since this represents a good compromise between pulp quality and production.

For the screening and bleaching operations, a Bailey Network 90 DCS was purchased. The purpose of this system was to take over all control in the screen room and bleachery areas, previously handled with analog control, push buttons, or PLCs or by hand. This included all control of the reject refiners and twin-wire presses, which have been more typically done using PLC or relay logic.

To ensure a smooth transition with the addition of this new technology, the mill placed a premium on training of personnel. Key personnel were immersed in training programs three months before startup. To foster a sense of ownership, the operators were involved in designing graphics for the DCS, designing control strategy, and purchasing equipment. A Tamsec process simulator proved to be a useful tool in training the operators, whose previous experience was hand-feeding logs into grinders. The ability to practice on the simulator built confidence and helped overcome any technological culture shock.

The result was that the operators were ready to handle the system when it was operational. The operators were so ready, in fact, that shifts now function without supervisors. Operators have taken on more responsibility and are solving their own problems.[10]

The main day-to-day control parameter for Niagara's groundwood quality is the decker freeness. The operators make changes at the grinders and in the screen room to adjust to the freeness target. The deviation

in freeness has been reduced by 40%, a direct result of improvements in the technology.[11] Niagara's primary strength measurement is burst. Burst has increased 24% to 36% with the startup of the new PGW mill.

JAMES RIVER. James River Corp.'s St. Francisville, La., mill faces unique challenges as quality standards rise. U.S. southern pine species, such as loblolly pine (*P. taeda*) and slash pine (*P. eliottii*), are characterized by relatively thick-walled, poor-bonding fibers and a higher percentage of darker summerwood content.

As a result, more energy is required in mechanical pulping, and the resultant pulp is often darker than the pulp produced from northern wood. Northern spruces have thinner-walled fibers, which fibrillate better, producing stronger and brighter pulps with less energy consumption.

The following data compares typical fiber dimensions of two softwood species commonly used in groundwood pulping—northern black spruce and southern loblolly pine:

	Black spruce	Loblolly pine
Length, mm	3.5	4.0
Dia, um	30 to 25	50 to 35
Cell wall thickness, um	1 to 3	3 to 8

PGW performs very well on a typical northern softwood (such as spruce) and on low-density hardwood (such as aspen in the North and cottonwood in the South). Of particular interest is that PGW provides even better quality improvements on pine than those experienced on spruce—for example, a 100% improvement in tear strength. In addition, PGW provides 5% to 10% reduction in energy consumption, especially with low-freeness pulps, than conventional pine groundwood. These improvements are achieved with retention of good printing properties.[12]

With the startup in September 1990 of the new PGW mill at St. Francisville, the James River mill becomes the first in North America to exploit the benefits of the PGW process on a southern furnish for LWC paper.

The three-grinder system produces 180 tpd of pulp for the mill's two LWC paper machines. Each 1.6-m grinder is driven by an 8,000-hp motor. Cottonwood and southern pine are co-ground. In addition to the automatic log-feeding system, pressure grinders, and hot loop auxiliaries, the project scope included modernizations of the reject refining, screening, cleaning, and postrefining systems and space for three additional grinders.

The selection of PGW was based on the following considerations:

- Kraft pulp reduction: greater strength of PGW pulp compared with the replaced SGW allows for the reduction of kraft content.
- Maintenance cost: replacement of vintage grinders with a modern PGW system significantly reduces maintenance costs.
- Titanium dioxide: ability to increase the furnish's mechanical pulp fraction improves opacity and reduces the need for expensive titanium dioxide.
- Labor costs: installation of a modern, fully automated PGW system offered significant benefits in terms of reduced operating labor requirements. ■

TABLE 1: **Modern groundwood/PGW mills.**

Company/location	Capacity (000 metric tpy)	Wood furnish	Startup date	Market grade
Madison Paper Industries, Madison, Maine	100	Spruce/fir	1991	SC
St. Mary's Paper Inc., Sault Ste. Marie, Ont.	100	Spruce/fir	1989	SC
Lake Superior Paper Industries, Duluth, Minn.	180	Spruce/fir	1987	SC
Blandin Paper, Grand Rapids, Mich.	200	Aspen/ spruce	1989	LWC
Niagara of Wisconsin, Niagara, Wis.	100	Aspen	1990	MWC
James River Corp., St. Francisville, La.	65	Cottonwood/ southern pine	1990	LWC

SC = Supercalendered "A/B" used principally for catalog and advertising insert market.
LWC = Lightweight-coated magazine paper.
MWC = Medium-weight coated for magazine and book papers.

REFERENCES

1. Woodbridge Reed & Associates, *Future of Bleached Mechanical Pulps.*
2. Richard S. Crebbin, "Recent Developments in Groundwood Processes and an Introduction to Modern Methods of Grinder Control," CPPA/TAPPI MPC Joint Meeting, Nanaimo, B.C., June 1990.
3. Anne Tunney, Andre Doucet, and Dave Harrison, "Groundwood Mill Expansion Experience at St. Mary's Paper Inc.," CPPA Annual Meeting, Montreal, Que., 1990.
4. Steve J. Semenchuk, "Pressure Groundwood," CPPA Mechanical Pulping Seminar, Course Notes, 1988.
5. Alan Rooks, "L.S.P.I.'s Edge? Motivated Workers, Top-Notch Tools," *PIMA*, February 1989, p. 17.
6. Randy Zupan, Gordon Mitchell, and Kevin Burkett, "Pulp Mill Modernization/Replacement at Blandin Paper Company, Grand Rapids, Minnesota, USA," APPITA General Meeting 1990, Rotorua, New Zealand.
7. Randy Zupan, "Pulp Mill Expansion, Blandin Paper Company," TAPPI Pulping Conference Proceedings, 1990, p. 561.
8. P. Haikkala, H. Liimatainen, and O. Tuovinen, "Effect of Alkaline Peroxide in Aspen PGW Process," 1989 TAPPI Pulping Conference.
9. A.C. Jensen, D. Chambers, and K. Moller, "The Influence of Furnish Properties on Newsprint Quality Using Pinus Radiata," APPITA General Meeting, 1989.
10. Doug Freeman, "From the Hole to the Hill: Automation at Niagara Paper PGW Installation," presented at CPPA Annual Conference, Montreal, Que., 1991.
11. Dave Antos, "Operators Play Key Role in New PGW Mill Startup at Niagara of Wisconsin," *Paper Age*, October 1990.
12. M. Aario, "Use of PGW to Improve Southern Pine Mechanical Pulp for Wood-Containing Papers," Preprint, 1985 TAPPI Pulping Conference.